

University students' research projects explore their own university

By Andrea Lynn

News Bureau Staff Writer

Undergraduate students have been conducting research at U.S. universities for years, but what happens when they are encouraged to do research on universities, particularly on their own?

UI students and faculty members are well on their way to discovering the answer – or answers – to that intriguing question, thanks to a new research and teaching effort, the Ethnography of the University (EOTU).

Last fall, EOTU faculty members began inviting undergraduate students, especially those in the social sciences and the humanities, to design university-related projects and to take part in a study of the university, giving them credit for their work and making their findings Web-accessible for other students, faculty and staff – now and in the future. The initiative draws on ethnography – the primary research method used in sociocultural anthropology wherein qualitative fieldwork explores the common-sense assumptions and categories that make up the everyday life and social relations of human groups.

Nancy Abelmann, one of two anthropology professors who have joined an English professor in organizing the research and teaching effort, believes that undergraduates, “as the university’s primary consumers, are ideally positioned to study both how and how well the university is doing its job.”

“They live and breathe it every day,” she said.

Nicole Ortégón, now a newly graduated anthropology major, responded to EOTU’s invitation and challenge last semester as a senior. For her project, she considered how the recent elimination of small discussion sections – which had just become casualties of state budget cuts – affected the interaction between students and their professors at Illinois.

More broadly, Ortégón asked “how students and faculty perceived the student-to-faculty ratio and how the ratio was ‘experienced’ and/or ‘felt’ in everyday university encounters.”

All of Ortégón’s research – from interviews and notes to final conclusions – has been archived on a Web site, as is the research of all other willing students participating in EOTU-affiliated courses. The Web site – at www.eotu.uiuc.edu/ – is intended to be a “living archive,” open to all university constituents.

Controlling material structure at nanoscale makes better thermal insulator

By James E. Kloepfel

News Bureau Staff Writer

Heat may be essential for life, but in some cases – such as protecting the space shuttle or improving the efficiency of a jet engine – materials with low thermal conductivities are needed to prevent passage of too much heat. As reported in the Feb. 13 issue of the journal Science, researchers have created a better thermal insulator by controlling material structure at the nanoscale.

“We explored ways to control thermal properties in materials by introducing structure on nanometer length scales,” said David Cahill, a UI professor of materials science and engineering and a Willett Faculty Scholar. “By making nanolaminates of dissimilar materials, we found that we could significantly decrease the thermal conductivity because heat cannot be carried efficiently across the material interfaces.”

Cahill, graduate student Ruxandra Costescu and colleagues at the University of Colorado at Boulder first synthesized thin-film nanolaminates composed of alternating layers of tungsten and aluminum oxide using atomic layer deposition and magnetron sputter deposition. Cahill and Costescu then measured the thermal conductivity of the nanolaminates using a technique called

“What is special about this initiative,” Abelmann said, “is that students will be able to build on material from other students and from earlier research.” Also noteworthy is the idea that students and professors “become their own learning community, committed to thinking about the university together.” Indeed, the initiative is organized to bring to undergraduates “a real benefit” of attending a large research university: the chance to do research that can be evaluated by faculty and peers and used by others.

The directors of the Ethnography of the University say they want student participants to understand that they, like students everywhere, have entered a university that has been “presenting and representing itself, telling stories or narratives about what it is, what it is doing and what it is meant to do for a very long time.” The students are being asked to analyze how their findings “relate to these many, often competing, narratives.” In this way, students learn to think about the university as an institution with an organizational history worthy of serious inquiry, Abelmann said.

Abelmann and the other directors, William Kelleher, a professor of anthropology, and Peter Mortensen, a professor of English, said that while they are immediately focused on “securing EOTU across the undergraduate curriculum” at Illinois, they intend to develop the project so that “its essential elements are readily adaptable to a range of higher education environments.”

According to the directors, EOTU directly addresses the findings of the 1998 Boyer Commission, funded by the Carnegie Foundation for the Advancement of Teaching, which reported that research-based learning has yet to flourish in the humanities and social sciences.

Active learning and faculty-student interaction are key to greatly enhancing students’ sense of engagement in college life, the directors said. Engaged students “arguably learn more and learn better” and, in the context of research universities, they “cultivate a lifelong habit of critical inquiry that is as important to responsible citizenship as it is to career success,” the directors said.

For Ortégón, EOTU already has paid big dividends, having opened a new way of thinking about her college experience – and beyond.

“EOTU has profoundly impacted my future educational, career and life ambitions,”

time-domain thermoreflectance.

“The reflectivity of a metal is a very subtle function of its temperature,” Cahill said. “By measuring how fast the reflectivity, and therefore the temperature, changes over time, we can determine the thermal conductivity.”

To measure the temperature of such small samples, the researchers use an ultra fast, mode-locked laser that produces a series of subpicosecond pulses. The laser output is split into a “pump” beam and a “probe” beam. The pump beam heats the sample and the probe beam measures the reflectivity, and hence the temperature.

“By making the individual layers only a few nanometers thick, we produced a nanolaminate material that had a thermal conductivity three times smaller than a conventional insulator,” Cahill said. “The high interface density produced a strong impediment to heat transfer.”

Heat flow from one material to another is limited at the interface, Cahill said. Heat is carried by vibrations of atoms in the lattice, and some of these lattice vibrations are scattered at the interface and don’t get transmitted across the interface.

“In our nanolaminates, vibrations in one material don’t communicate well with those in another,” Cahill said. “The heavy

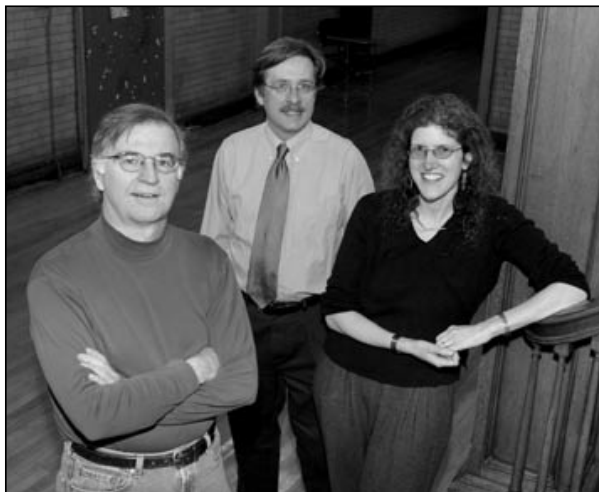


photo by Bill Wiegand

Closer look Students, the consumers of education, may be uniquely qualified to evaluate how well a university is doing its job, according to Nancy Abelmann (right), professor of anthropology. Abelmann and colleagues William Kelleher (left), professor of anthropology, and Peter Mortensen, professor of English, are inviting undergraduate students, particularly those in the social sciences and the humanities, to design and conduct ethnographic research projects on various facets of the university. The Ethnography of the University is the 11th cross-campus initiative to receive seed funding from Chancellor Nancy Cantor’s office.

she said. “My past year’s work with EOTU has inspired me to pursue a course of graduate study that seeks to explore the interface between anthropology and education, investigating such topics as educational technologies and learning and teaching policies and practices.”

In the fall of 2003, the pilot program supported 13 undergraduate research interns and operated through six classes: one anthropology course, four freshman rhetoric classes and one upper-level English class. The rhetoric classes, like all EOTU courses, focused on developing research and writing skills, but in this case, the subject matter was the university.

While EOTU is open to all research that addresses the university as an institution, it has delineated seven areas of “focused inquiry”: globalization and the university; learning communities; race and the university; student writing; technology and student life; the university and the surrounding community; and university archi-

val practices.

Recently, the Ethnography of the University was named the 11th cross-campus initiative to be underwritten with seed money from the office of Chancellor Nancy Cantor.

The project also was recently commissioned to study the campus’s ongoing Brown v. Board of Education Jubilee Commemoration. For this project, the group assembled a team of paid researchers – four undergraduate researchers and two graduate research advisers – who are looking “beyond the events to the conversations that encircle them,” hoping to capture both “the campus dialogue and silence on race and diversity,” Abelmann said.

The Brown Commemoration Ethnography project offers seasoned student researchers the unique opportunity to make a difference with their expertise and analysis. Indeed, the Ethnography of the University at large is committed to just this, Abelmann said: “student researchers making a difference.” ♦



photo by Jason Lindsey

Thermal insulator Using a technique called time-domain thermoreflectance, graduate student Ruxandra Costescu is measuring the thermal conductivity of the thin-film nanolaminates synthesized in the UI lab of David Cahill, professor of materials science and engineering.

“The researchers’ findings also have some surprising implications for

nanomaterials that are intended to perform as high thermal conductors in applications such as dissipating heat from electronic circuits or sensors. For example, carbon nanotubes – which have been shown to have extremely high thermal conductivities – will not perform well as fillers in composite materials designed to improve thermal transport.

“Nanotubes do not couple well thermally to the surrounding material,” Cahill said. “As a result, the heat transport across the nanotube-matrix interfaces will be very limited.”

The National Science Foundation and the U.S. Department of Energy funded the work. ♦